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| **20IT403** | **DATABASE MANAGEMENT SYSTEMS** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |
| **OBJECTIVES:**   * To understand the basic concepts of Data modeling and Database Systems. * To understand SQL and effective relational database design concepts. * To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure. * To understand efficient data querying and updates, with needed configuration * To learn how to efficiently design and implement various database objects and entities | | | | | |
| **UNIT I** | **DATABASE CONCEPTS** | | | | 9 |
| Concept of Database and Overview of DBMS - Characteristics of databases, Database Language, Types of DBMS architecture – Three-Schema Architecture -Introductions to data models’ types- ER Model- ER Diagrams Extended ER Diagram reducing ER to table Applications: ER model of University Database Application. SQL fundamentals Views - Integrity Procedures, Functions, Cursor and Triggers Embedded SQL Dynamic SQL. | | | | | |
| **UNIT II** | **DATABASE DESIGN** | | | | 9 |
| Design a DB for Car Insurance Company - Draw ER diagram and convert ER model to relational schema. Evaluating data model quality - The relational Model Schema Keys Relational Algebra Domain Relational Calculus- Tuple Relational Calculus – Fundamental operations. Relational Database Design and Querying Undesirable Properties of Relations Functional Dependency: Closures- Single Valued Dependency Single valued Normalization (1NF, 2NF 3NF and BCNF) - Desirable properties of  Decompositions 4NF - 5NF Denormalization | | | | | |
| **UNIT III** | **TRANSACTIONS** | | | | 9 |
| Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery | | | | | |
| **UNIT IV** | **DATA STORAGE AND QUERYING** | | | | 9 |
| RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices  – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Overview of physical storage structure- stable storage, failure classification -log based recovery, deferred database modification, check-pointing-File Structures:-Index structures-Primary, Secondary and clustering indices. Single and multilevel indexing. Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation | | | | | |
| **UNIT V** | **ADVANCED TOPICS** | | | | **9** |
| Distributed database Implementation Concurrent transactions - Concurrency control Lock based Time Stamping-Validation based. NoSQL, NoSQL Categories - Designing an enterprise database system - Client Server database | | | | | |
| **TOTAL: 45 PERIODS** | | | | | |
| **OUTCOMES:**  **At the end of this course, the students will be able to:**  **CO1:** Implement SQL and effective relational database design concepts.  **CO2:** Map ER model to Relational model to perform database design effectively  **CO3:** Compare and contrast various indexing strategies in different database systems  **CO4:** Implement queries using normalization criteria and optimization techniques  **CO5:** Analyze how advanced databases differ from traditional databases.  **CO6:** Design and deploy an efficient and scalable data storage node for varied kind of application requirements | | | | | |
| **TEXT BOOKS:**   1. Elmasri R. and S. Navathe, “Fundamentals of Database Systems”, Pearson Education, 7th Edition, 2016. 2. Abraham Silberschatz, Henry F.Korth, “Database System Concepts”, Tata McGraw Hill , 7th Edition, 2021. 3. Elmasri R. and S. Navathe, “Database Systems: Models, Languages, Design and Application Programming”, Pearson Education, 2013. | | | | | |
| **REFERENCES:**   1. Raghu Ramakrishnan, Gehrke “Database Management Systems”, MCGraw Hill, 3rd Edition 2014. 2. Plunkett T., B. Macdonald, “Oracle Big Data Hand Book” , McGraw Hill, First Edition, 2013 3. Gupta G K , “Database Management Systems” , Tata McGraw Hill Education Private Limited, New Delhi, 2011. 4. C. J. Date, A.Kannan, S. Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2015. 5. Maqsood Alam, Aalok Muley, Chaitanya Kadaru, Ashok Joshi, Oracle NoSQL Database: Real- Time Big Data Management for the Enterprise, McGraw Hill Professional, 2013. 6. Thomas Connolly, Carolyn Begg, “ Database Systems: A Practical Approach to Design, Implementation and Management”, Pearson , 6th Edition, 2015. | | | | | |

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| **20IT412** | **DATABASE MANAGEMENT SYSTEMS LABORATORY** | **L** | **T** | **P** | **C** |
| **0** | **0** | **4** | **2** |
| **OBJECTIVES:**   * To understand data definitions and data manipulation commands * To learn the use of nested and join queries * To understand functions, procedures and procedural extensions of databases * To be familiar with the use of a front-end tool * To understand design and implementation of typical database applications | | | | | |
| **LIST OF EXPERIMENTS:** | | | | | |
| 1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements 2. Database Querying – Simple queries, Nested queries, Sub queries and Joins 3. Views, Sequences, Synonyms 4. Database Programming: Implicit and Explicit Cursors 5. Procedures and Functions 6. Triggers 7. Exception Handling 8. Database Design using ER modeling, normalization and Implementation for any application. 9. Database Connectivity with Front End Tools 10. Case Study using real life database applications anyone from the following list     1. Inventory Management for a EMart Grocery Shop     2. Society Financial Management     3. Cop Friendly App – Eseva Property     4. Management – eMall     5. Star Small and Medium Banking and Finance  * Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application. * Apply Normalization rules in designing the tables in scope. * Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features. * Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer. * Ability to showcase ACID Properties with sample queries with appropriate setting | | | | | |
| **TOTAL: 60 PERIODS** | | | | | |
| **OUTCOMES:**  **At the end of this course, the students will be able to:**  **CO1:** Apply typical data definitions and manipulation commands.  **CO2:** Design applications to test Nested and Join Queries  **CO3:** Implement simple applications that use Views  **CO4:** Implement applications that require a Front-end Tool  **CO5:** Critically analyze the use of Tables, Views, Functions and Procedures. | | | | | |